



Delaware County Regional Water Quality Control Authority
CSO Long Term Control Plan Update

Rainfall and Flow Monitoring Quarterly Report No. 1 (Draft)

July 2016



GREELEY AND HANSEN

Rainfall and Flow Monitoring Quarterly Report No. 1

Section 1 Introduction

The Delaware County Regional Water Quality Control Authority (DELCORA) entered into a Consent Decree (CD) with the United States Government in August 2015. The purpose of the Consent Decree is to establish a schedule for implementation of Long Term Control Plan Update (LTCPU) to achieve full compliance with the Clean Water Act and the regulations and Clean Streams Law and regulations. The lodging of this Consent Decree was entered by the court on August 17, 2015, it was signed and filed on November 10, 2015 by the United States District Court for the Eastern District of Pennsylvania.

According to the Consent Decree, DELCORA's Hydrologic and Hydraulic Model (H&H Model) must be updated to meet the requirements in Section V.A.14 of the Consent Decree. A detailed plan to update, calibrate and validate the H&H model has been submitted and approved by the USEPA on March 1, 2016. Additional rainfall and flow monitoring is required to calibrate and validate the H&H model. Requirements of rainfall and flow monitoring are detailed in the Consent Decree Section V.A.14.d and e, which is included in the following:

- "d. Rainfall and flow monitoring shall be carried out in accordance with current good industry practice for a period of at least twelve (12) months, in accordance with the schedule included in the approved plan. Rainfall data shall be obtained at a minimum effective density of 1 gauge/virtual radar-based gauge per square kilometer, for the entire Model Area. Flow monitoring shall be carried out using sufficient monitors to allow the accurate characterization of dry and wet weather flows from the entire Model Area, and the response of each CSO to wet weather flows.*
- e. For all rainfall and flow monitoring carried out in support of efforts to update and calibrate the H&H Model, DELCORA shall prepare and submit to Plaintiffs for review and comment in accordance with the requirements of Section VI (Review and Approval of Submittals) quarterly technical memoranda documenting the results and quality of the rainfall and flow monitoring data."*

In summary, rainfall and flow monitoring shall be conducted for at least 12 months, and quarterly technical memoranda shall be submitted to Plaintiffs for review.

To satisfy the above mentioned rainfall and flow monitoring requirements, and in accordance with the submitted DELCORA H&H Model Update and Calibration Plan, DELCORA has installed 5 new rain gauges and 38 new flow meters in its sewer collection system. Starting from March 18, 2016, most of the newly installed rain gauges and flow meters were in service and began generating data.

This report is a summary of the first quarter reporting for Rainfall and Flow Monitoring during March 18, 2016 to June 30, 2016.

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Section 2 Rainfall Monitoring

2.1 Rainfall Monitoring Locations

The site locations of the four existing and five newly installed rain gauges are shown in **Figure 1**. These rain gauges provide an effective spatial coverage of the entire WRTP's service area.

The four (4) existing rainfall gauges are in Delaware County that record precipitation in 15-minute increments. The gauges are located at the following DELCORA owned facilities:

- Western Regional Treatment Plant (WRTP, will be used for model calibration)
- Central Delaware County Pump Station (CDPS, will be used for model calibration)
- Muckinipates Pump Station (MPS, will be used for model calibration)
- Darby Creek Pump Station (DCPS, will NOT be used for model calibration)

The five (5) newly installed rain gauges are listed in **Table 1** with detail information of rain gauge location, service starting date, and data recording interval.

Table 1: Newly Installed Rain Gauges

	Rain Gauge ID	Location	Service Start Date	Data Interval
1	RG_Rose Valley	18 N. Longpoint Lane, Media, PA	3/05/16	5-minute
2	RG_Chester-PS	55 East 2nd Street, Chester, PA	3/05/16	5-minute
3	RG_NCPS	1628 Naamans Creek Rd., Marcus Hook, PA	3/05/16	5-minute
4	RG_Springfield	217 Saxer Avenue, Springfield, PA	4/03/16	5-minute
5	RG_UCT	1671 N. Upper Providence Road, Media, PA	4/16/16	5-minute

2.2 Rain Gauge Calibration/Verification Procedure

Rain Gauge calibrations were performed during the rain gauge installation. Additional calibrations will be performed to the manufacturer's specifications on a bi-annual basis or as needed if irregular data is observed. Rain gauges are routinely checked for debris, and cleared after snow/ice storms.

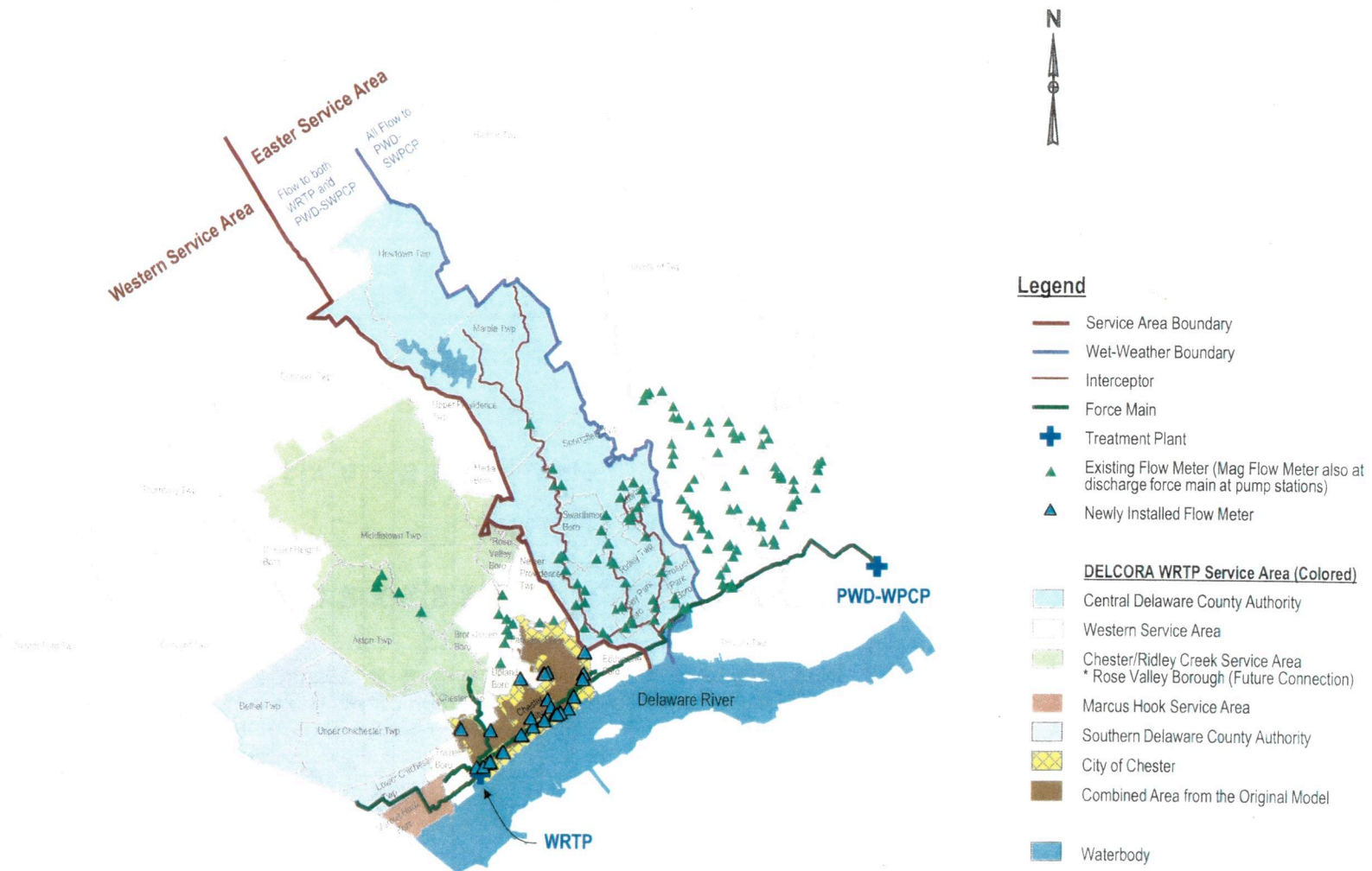
Each "tip" of the rain gauge bucket should correspond with 0.01" of rain. To ensure the modem is reading the tipping bucket pulse accurately, the tech will tip the bucket 10 times in rapid succession. The tech should see that 0.1" of rain is recorded.

2.3 Rainfall Event Summary

Rainfall events were analyzed for each individual rain gauge based on the inter-event time of 12 hours. In total there were 31 rainfall events during reporting period. **Table 2** lists rainfall events with total precipitation greater than 0.1 inch.

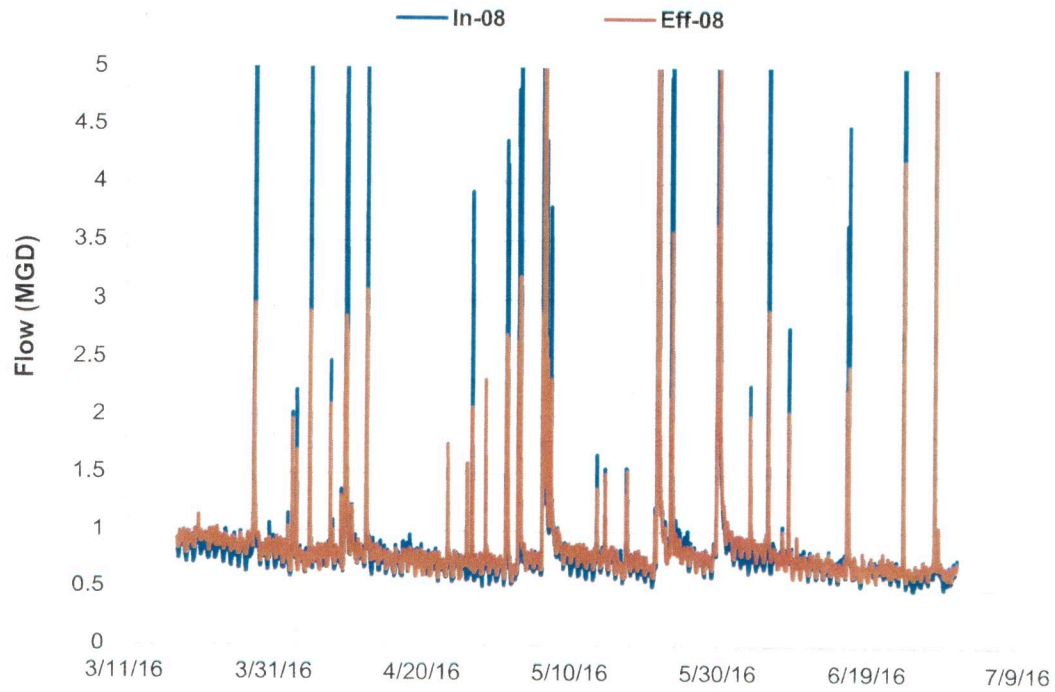
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Figure 5: Existing and Newly Installed Flow Meter Locations



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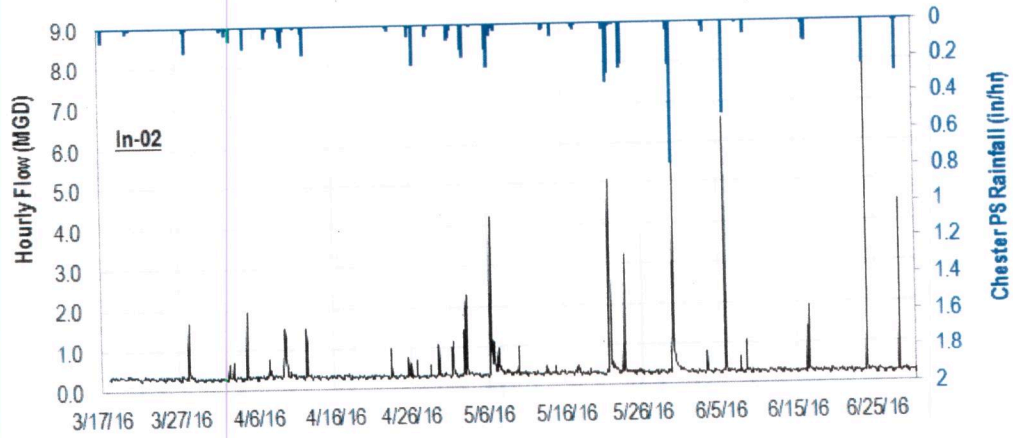
Figure 9: Flow Hydrograph In-08 and Eff-08



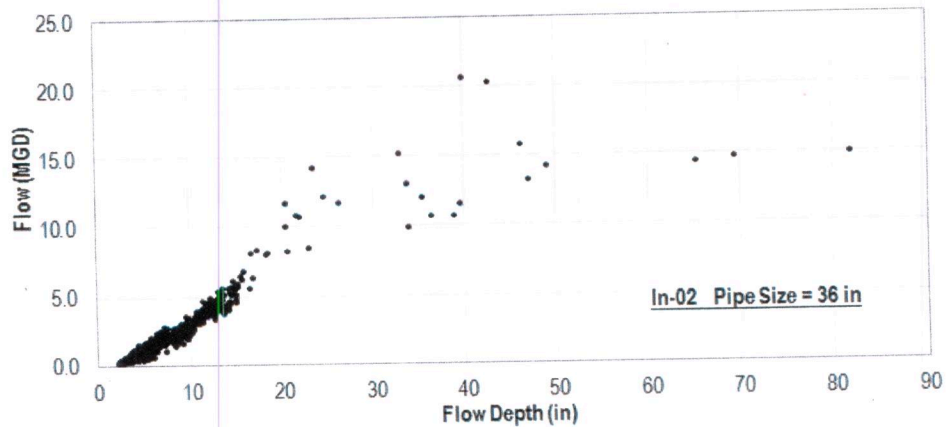
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Figure 10: Flow Monitoring Data, In-02

Hourly Hydrograph



Scattergraph (Flow vs. Depth)



CSO#02 Influent, Effluent and Overflow

